A "Psychic Contest" Using A Computer-RNG Task In A Non-Laboratory Setting

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Abstract

An exploratory, computer-controlled RNG study conducted in a non-laboratory setting and represented as a "psychic contest" is described. The study was undertaken to examine whether the Psilab II "Volition" program could be profitably used to explore intentional or nonintentional psi in the setting of a "psychic fair". Sixty two subjects were selected out of a larger population, on the basis of their z-score in a preliminary psi test. Subjects were allowed up to two Volition games each; 118 games were collected over the three day period of the fair. An equal number of "simulation" games, in which no subjects were present, was also collected. In each game, both "feedback" RNG samples (determining the progression of the feedback display), and "silent" samples (which do not affect the game's feedback display) were stored. Feedback and silent data were compared to theoretical distributions through goodness-of-fit tests, using end-game scores (z-scores) and within-game scores (run-scores) as entries. The analysis of end-game scores yielded no significant feedback or silent results, but the silent run-score was significant (chi-square (28) = 47.03, p=.01). Neither the matched-simulation experiment, nor a subsequent series of 100 extended-simulation experiments showed any evidence for RNG malfunction. The silent run-score result replicates the findings of two prior Volition experiments by Berger (1988), and suggests the feasibility of employing well-standardized computer psi-tests for "field" investigations of psi.

Introduction

In the last decade, computerized psi tasks have become increasingly popular in research laboratories, gradually replacing the standard tools of prior generations, like Zener cards, dice, and stand-alone random number generators (RNGs). This trend is largely due to the fact that computers enable considerable experimental control, while introducing previously unimaginable flexibility in hypothesis testing and data analysis. Further, the trend toward computerized psi-tasks reflects a growing interest in inter-laboratory cooperation.

The release of "PsiLab II" (Berger & Honorton 1984; Psychophysical Research Laboratories (PRL), 1985), a standardized computer-RNG psi-testing system, has introduced a new level of sophistication in collaboration and replication efforts. One major advantage of PsiLab II is that, because of its standardization (e.g., in hardware, data-collection protocols, and subject feedback), it allows for systematic comparisons of results across different investigators and subject populations. Furthermore, because of its portability and built-in safeguards, PsiLab II can be considered a self-contained "laboratory", i.e., a transportable testing environment which can be taken outside the laboratory to potentially promising environments.

The current study constitutes the first known attempt to utilize Psilab's automated computer-RNG tasks under circumstances quite removed from those of laboratory research. The occasion was a 3-day conference in Montreal, where I had been invited to give talks on psi research. In addition to the formal presentations, there was a "psychic fair", with holistic health merchants, New Age artists, tarot-readers, palm-readers, astrologers, past-life regressors, and other colorful personalities. It seemed to be an interesting setting for a psi experiment, and, about a month prior to my arrival, I proposed creating a "psychic contest" for the fair. The organizers were overjoyed with the idea (thinking, no doubt, of the associated publicity) and agreed to rent out a sizable booth at a discount.

The "contest" involved two tasks, each involving a separate computer. The first, a computer psi-game I created for the occasion, served as a screening/motivational device. The second, the "official" psi task, was PsiLab's "Volition" game. Volition is a computer psi game experiment in which subject-initiated button presses sample the RNG. Each button press (run) samples 100-bits of RNG data which drive a graphic feedback display. Another 100-bits, designated as "hidden" or "silent" data, are also sampled but not displayed to the subject who is blind to these data. I chose Volition partly because, from among several available choices, it seemed the easiest to explain, in a hurry, to a subject "off the street"; and partly because it has already been used in a number of studies, with some success.

<u>Prior research with Volition</u>
The first Volition study, conducted at Psychophysical Research Laboratories [PRL] (PRL, 1984) involved 20 participants, each contributing 10 "games" (with 100 runs each containing 100 bits). Overall, there was no evidence for psi in the "feedback" samples, but a significant excess of subjects obtained independently significant results in the "silent" data. The silent effects were non-directional: game outcomes deviated significantly from chance, but not consistently with the person's "aim".

Palmer & Perlstrom (1987) reported a Volition study with 30 subjects, examining the effect of different instructional sets (instructions emphasizing directional control vs. extremeness of scoring). Results from this study are difficult to interpret, due to the multiplicity of analyses undertaken, but the most salient finding seemed consistent with PRL results: game-score variance in the silent samples was relatively high with instructional sets for "extreme" scoring, and relatively low when subjects were aiming for the "chance" line.

Two more Volition studies, reported in Berger (1988), and based upon run-score variability (rather than game-score variance) produced conceptually similar results. In the first, involving 10 subjects (including the investigator) significant run score variability was obtained in the silent data, whereas no effect was evident in the feedback data; removal of the experimenter's data did not substantially change the results. In the second study, in which the investigator was the only subject, significant run-score variability was again found in the silent, but not the feedback samples. These results with Volition replicated the results of two earlier studies by Berger (1988), using similar RNG sampling procedures but based on a different feedback task (PsiLab's "Psi Invaders).

In short, Volition has consistently shown some promise for eliciting non-directional silent data effects. Naturally, given that many RNG-feedback studies have demonstrated intentional psi, one wonders whether there is something special about Volition (and other tasks which include a "silent" condition) which specifically invites unintentional psi effects. Does the mere existence of a silent condition distract from the intentional task and invite "displacements"? Schechter (1987) reported data supportive of a "displacement" interpretation: individuals who tended to "miss" in the feedback task (i.e., to obtain end-results contrary to their chosen aim) tended to "hit" in the silent task.

On the other hand, it is also possible that silent effects are, in fact, no more than experimenter effects. First, the investigators' own psi could be shaping the silent data - during the session (through psi-mediated data sorting or through "conformance behavior"), or retroactively (as suggested by Observational Theories). Alternatively, the investigators' expectations may create tacit "demand characteristics" in the study, which unconsciously influence subjects' psi performance. The reported Volition studies have been based upon intensive laboratory work with self-selected volunteers--people who have prior interest in psi (and in psi research), and who are given a fair amount of attention prior to, and during the testing (through repeated laboratory visits, interchanges with lab members, extended task-explanations and demonstrations, etc.). Under such circumstances, it is plausible to believe that subjects might simply "give the experimenter what he wants" - if not feedback effects, at least silent effects.

The question of the experimenter's role is particularly pertinent when it comes to automated tasks like Volition. Such tasks hold promise as self-contained, experimenter-independent procedures. But to be used in this manner, they must be motivationally (and not just methodologically) self-contained; they cannot depend too much upon inspirational investigators and special interpersonal settings.

The "psychic fair" Volition contest thus seemed to be a way to determine whether effects similar to those already reported would be obtained in situations in which individuals' motives for participation and interactions with the investigator are quite different from those typical of laboratory research. Though participants would still interact with the investigator, and could not be considered 100% "off the street" (not in a psychic fair!), still, several factors rendered the setting much closer to the "real world" than to the world of the laboratory. To mention a few: the billing of the psi test as a contest, the market-place ambience of the "psychic fair", the necessarily brief (and business-like) subject-experimenter interactions, the concrete possibility of winning a prize, and, above all, the stiff price each person had to pay to have a shot at it!

Subjects

Because it was impossible to know, in advance, how many individuals would be drawn to the "contest", and how many would meet the screening criteria set, the number of subjects could not be defined in advance (though an upper limit of 100 subjects was set). To avoid accusations of "optional stopping", the limits of the experiment were defined temporally: it was decided to run all subjects meeting the screening criteria, from the opening of the fair until closing time each day (i.e., 10:00 PM). Each subject would be allowed a maximum of two Volition games.

Generally, subjects either came purposefully to the testing booth, after having read notices for the contest elsewhere in the fair, or wandered in, attracted by the crowds and/or the computer displays. In the three days of the fair, over 220 people paid to take part in the screening task. Of these, 62 participants (information on gender breakdown was not retained) met screening criteria, and were willing to pay the extra fee to participate in Volition. With the exception of one individual, who was a fellow psi researcher, none of the participants had been formally tested for psi (until then); of course, many of them may have had spontaneous experiences or tested themselves informally, but this was not explored.

Setting

The experiment took place in one of the booths set up for the "Sommet Esoterique" at the Velodrome Olympique of Montreal. Because the environment was quite bright and noisy, a special tent was constructed with dark fabrics, closing in the testing area on three sides and on top. The area under the "tent" was about 12 meters square.

The two computers used were placed at right angles to each other, on separate tables, with the color computer facing the opening of the tent.

Hardware

An Amiga 1000 with a color screen, a "mouse", two disk drives, and a 2 megabyte memory extension was used for the preliminary screening task. For the Amiga, no hardware RNG was used; the random digits were based upon an algorithm, reseeded by the computer's clock.

An Apple IIe with a green/black screen, two disk drives, two "paddles" and a printer was used for the official psi task. The source of random digits for the Apple psi task was a Psilab II noise-based RNG, fitted into Slot 5 of the Apple. This RNG had been given to the author in 1985 by PRL staff, after having passed a battery of tests ensuring its proper operation. A detailed presentation of the PRL component integrity tests, safeguards (such as shielding), and randomness checks is available elsewhere (Berger & Honorton, 1984; PRL, 1985).

Volition: In Psilab's Volition test, subjects are provided with continuous visual feedback as to their cumulative RNG scores through a graphic line which moves across the screen, in short segments. Each time the subject presses the button of the Apple game paddle, a 100-bit RNG sample is taken and compared to an alternating "target" bit stream; this yields a run-score with a mean chance expectation of 50 and standard deviation of 5. The run-score is added to previous scores and the cumulative z-score calculated; this determines the direction (upward or downward) and slope of the new feedback-line segment. Thus, above chance scores tend to direct the feedback segment upwards, below chance downwards. With the help of trend lines demarcating chance, and plus and minus 2- and 3- standard-deviation thresholds, the evolving feedback line represents clearly the cumulative performance of the person at each moment.

In parallel to the feedback RNG runs, each buttonpress results in a 100-sample silent run, as well. The designation of relative order (whether the first of the two samples is "feedback" or "silent") is alternated on a run by run basis.

The Volition task used in the study was practically identical to that described in full in Berger & Honorton (1984), and Berger (1988). Only two differences were introduced. First, through the Design option, the game length was set at 20 100-sample RNG runs (in contrast to other investigators' setting of 50 or 100 runs). Second, at the beginning of each game, subjects were only asked if they prefer "Hi-aim" or "Lo-aim". They were not offered any other options for "tailoring" the feedback to their preferences; these options had been set previously (with "graphic designs" off, and all other options on).

Buddha Game: The Buddha Game was written for the Amiga computer, in the C language, by a programmer who followed the author's instructions. As in Volition, the subject's buttonpress results in a series of random bits; the subject attempts to "sense" the right moment, so as to obtain the maximum run-score possible. Unlike Volition, however, the random bits are not obtained from a hardware RNG, but are derived from the built in Amiga random function, "reseeded" by a digit from the Amiga clock.

Essentially, the game consists of a series of digitized images depicting a golden Buddha statue surrounded by an electric blue aura. Depending on the random score obtained, the buddha image either grows in size (giving the impression of an advance toward the user) and then turns clockwise, or turns counter-clockwise and then diminishes in size (giving the impression of a retreat). Accompanying these movements is a digitally sampled sound, vaguely resembling "Ahhhh", which decreases in pitch with "advances" and increases in pitch with "retreats".

At the beginning of the game, the Buddha is positioned at the "mid-point", half way from the first and last images. Once the subject presses the Amiga's left "mouse" button, the RND function is sampled 10 times, yielding a series of 1's and 0's. If the runscore is over 5, the Buddha advances, if under 5, he retreats, and if at 5 he stays stationary. The greater the departure from the expected score, the greater the advance or retreat from the current position. The goal of the individual is to make the Buddha either advance or retreat consistently, so that he reaches either of the two end points. The complete game consists of 22 buttonpresses (runs). Following the last run, a sampled (digitized) sound of children laughing is heard, the screen goes blank, and the overal game z-score is displayed.

At the time of the fair, this program was not finished. No procedure for entering subject names, or for storing subject data had been implemented, and there was no provision for control runs. Thus, I decided in advance that this game's outcomes could not be used to assess psi performance; instead, they would just serve as a motivational "prop" for Volition, i.e., as a means for persuading the person that they are ready for the "real" test.

Procedure

As it turned out, the contest was the most popular event of the fair, and our booth was literally deluged with people crowding around, waiting for their chance to test their psychic muscle. The unanticipated popularity of the contest resulted in a a rather hectic atmosphere, clearly removed from the sanguine, well-disciplined atmosphere of the laboratory. Though an effort was made to keep the situation under control, some variations in testing conditions and experimenter-subject interactions were inevitable.

Upon arriving at the tent, people would either read the posted explanations of the contest, or would inquire further as to what's going on. If I was momentarily available, I would briefly explain the general idea; otherwise, I would direct individuals to the posted explanations, and ask them to await their turn, for more details. (No attempts were made to solicit participants; it was completely unnecessary, at any rate). In general, Volition was presented as the "official" task to which subjects had to "graduate": they first had to participate in the Buddha game, and obtain a minimum z-score of 1, in order to qualify for Volition.

If interested, the person would pay the cashier the fee for the Buddha game ($3.00), and a ticket would be given, with the word "Buddha" and the corresponding fee written on it, as well as the person's name, address and phone number. The receipts were numbered, and as soon as one participant finished with the Buddha game, the next one would be called by number, and sit in front of the Amiga screen. I would then explain the Buddha game. There were some variations in instructional set, from subject to subject, as some people had already been there for a while, and had seen several demonstrations, while others were newcomers. Generally, subjects were told that the Buddha game tests their intuition, their ability to "sense" the right time for pressing the button, in order to obtain high scores. I used the analogy of a fast-spinning roulette wheel, with numbers on it, which the subject stops, through his button press; if they stopped it, say, on "odd" numbers, then the Buddha would advance, if on "even", he would retreat. It was stressed that the goal is to be consistent in finding "odd" or "even" numbers, and that the degree of consistency would be signified by the Buddha's progress in one particular direction (advancing or retreating). I then showed the subjects how to use the "mouse", and stayed next to them for the first few trials, until I felt they understood the relationship between the Buddha movements, and their scores.

Following these instructions, I would either move back, and join the crowd behind the Buddha game player, or would turn to the next Volition player, i.e., the person who had already passed the Buddha game, and was waiting for me to start Volition. Meanwhile, the Buddha game player would go through the psi task alone, pressing the mouse-button repeatedly until the game ended, and the final z-score was displayed. I marked the score on their receipt, and then gave the person some feedback, modulating my comments according to the absolute z-score. If the score was below 1, I would generally reassure subjects that they were undoubtedly much more intuitive than the score suggests; but then I would add that the contest procedure demands a minimum score of 1 to continue. (In a few cases, in which the z-score was over .9, and in which I sensed the person was greatly disappointed that they had "just missed the mark", I made an exception and allowed them to enter the Volition test). With absolute z-scores of 1 or higher, I generally created quite a fuss (the higher the score, the greater the fuss), and concluded by telling subjects that they could now participate in the contest, if they wanted to, but that they were not in any way obligated to do so.

If they did decide to continue with Volition, they went to the cashier, who collected the appropriate fee ($4.00), and marked the word "Volition" on the receipt. The participant would then wait in the Volition queue, or come directly to me, if no one was currently playing Volition. At this point, I would start the Volition session by typing in my three-character password (these characters are not displayed on the screen), and then register the participant by name. Under "participant ID", I would type in the absolute z-score obtained in the Buddha game; this, however, was only done after the first few sessions had been completed (thus Buddha game scores are missing for 7 subjects).

I introduced Volition by stating that this test was somewhat more challenging than the Buddha game, but that their score on the Buddha test showed they were "up for it". I added that Volition was also more accurate: the person could trace his scoring patterns with great precision, and use these to test mental strategies. It was also explained that, whereas the Buddha game was strictly based on intuition, here, one could alternatively use a "mental force" (i.e., PK) approach and "oblige" the line to move in the desired direction.

When the Volition "aim" question came up, I used the analogy of "heads" or "tails", in a coin toss, to convey that subjects could choose either "hi-aim" or "lo-aim". However, I also stressed that this was merely a focusing device; if the feedback line insisted on moving in the direction opposite to their choice, they should just "go with it", and try pushing it even further in that direction. I emphasized that the winner of the contest would be the one whose feedback line departed maximally from the baseline, irrespective of aim.

I then would input subjects' "aim" choice myself, using the game-paddle, and would hand them the paddle when the complete Volition display had been drawn on the screen. The "mode" for all subjects' first game was "manual". Subjects were urged to press the button once, so they could see the first segment of the feedback line, and understand its movement in relation to their "aim" and the baseline. Then I would leave them on their own. Following completion of the first game, I commented on the score; again the higher the absolute z-score, the greater the compliments. With low absolute z-scores (below 1) I sought to point to something promising in the feedback curve and attributed declines to a loss of concentration.

In all cases, I offered subjects a second opportunity, stating that they were entitled to a maximum of two games, with the best score of the two being used for the contest. The great majority of participants did indeed choose to play a second game. All were again asked for "high" or "low" aim; then the subject proceeded, as in the first game, using the "manual" mode. (In the case of 2 subjects, after having observed their frustration in the first game, I suggested they try the "automatic" Volition mode, to see if their scoring would improve). In cases where subjects had high absolute z-scores (over 1.8) in either of the two games, they were told to make sure they return for the closing night of the fair, when the winners would be announced.

Toward the end of each day (around 10:00 PM) the cashier was instructed to stop accepting payments for the Buddha game.

After "running" the remaining subjects, the equipment was turned off, and the front of the tent closed. The equipment was left in the tent overnight, but I took the Voltion program and data disks home with me. Guards were present in the area of the booths the entire night (as all vendors would leave their merchandise there), and one of the organizers slept in our tent, to ensure the safety of her Amiga (which she had lent me, for the screening test).

At the end of the third day, all z-scores and subject names were printed out on a sheet, and the highest absolute z-scores singled out. With the help of the organizers of the fair, we announced the winners of the contest, and invited them to come collect their prizes. In instances where a winner was not present, the individual with the next highest z-score was called. This continued until the first prize (a small Canon computer) and three second prizes (some posters) had been distributed.

A lapse in protocol occurred in one game, and I was forced to be the subject because I accidentally started the game myself. As mentioned earlier, I would set subjects' aim. High aim is selected by turning the paddle knob fully clockwise, and then pressing the paddle button. However, this knob setting also sets the game which follows on "automatic" mode, whereby the feedback line immediately starts moving across the screen without any further button presses. It was because of this that I always input the subjects' "aim" preferences (hi-aim, in the vast majority of cases) myself. However, in this one instance, I must have been somewhat fatigued, because I forgot to immediately turn back the paddle knob, counter-clockwise, just after inputing the subject's aim. The Volition display came on, and, as I was preparing to hand over the paddle, I saw (dumbfounded) the feedback line move all by itself. I immediately turned the knob counter-clockwise, but the damage had already been done, and a few runs had definitely accumulated, moving the feedback line in the wrong direction. Passing this situation over to the subject (who was dreaming about the first prize) would have been in poor taste, so I was forced to complete that game myself. It turned out to yield the highest absolute z-score in the experiment (-2.68).

Simulations

Simulation games: The second night after the closing of the psychic fair, I initiated a series of matched "simulation" games, provided with all Psilab II software. Generally, these simulate sampling and timing conditions of the game, but without a player pressing the button, and with no image on the screen. The Apple and RNG were situated in the room in which I was staying, and the simulation, involving a total of 118 games (the number of contest games accumulated over the 3 day period) took place overnight, while I was sleeping. Due to the logistical constraints, it would have been impossible to run the simulations in situ.

Extended Simulations: Psilab II comes with two Random Analysis programs - the Frequency Analyzer and the Serial Analyzer. Prior to undertaking the present study, it was attempted to run both of these programs; neither of them worked.[1] Later, however, an alternative approach was suggested by Berger, who kindly provided the software necessary to perform a series of "extended simulations" which could serve as an empirical background against which the present experiment and matched- simulation could be juxtaposed. Quoting from Berger (1988):

"Extended simulations are composed of the equivalent amount of data as a complete experiment (as contrasted with the matched game simulations which each have the equivalent of one game's data)...For the extended simulations, the RNG sampling software was extracted from [the game program] and the quasi-random inter-trial latencies produced by subjects in experimental games was replaced by a fixed-speed sampling regimen operating at the full speed capable of the Applesoft BASIC language. Extended simulations test both the integrity of the hardware and software used in the experiments, as any systematic biases in either should be magnified" (in press).

Hypotheses and planned analyses

Previous Volition research unequivocally pointed to non-directional silent-condition effects (either at the run-score or terminal z-score level). Implicitly, the experimenter's expectation was that similar effects might turn up in the present study. However, no explicit predictions were made. Because of the unusual data-collection circumstances, it seemed more appropriate to adopt a "wait and see" attitude; the study seemed best conceived as exploratory, rather than as a replication.

Nevertheless, certain specific analyses were planned. Insofar as both end-game and run-score measures have shown promise in past Volition studies, both were used as dependent variables. Each measure was assessed through a goodness-of-fit test.

Run-score variability was examined through a chi-square goodness-of-fit test, identical to that utilized by Berger (1988) in his own Volition studies. Essentially, this test involves comparisons of the observed frequency of each run-score value (e.g., 48, 49, 50, 51, etc.) with the expected frequency for that value.

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1. Failure was due to an incompatibilitywith the printer hardware, which has since been corrected

Cumulative (terminal) z-scores were examined through the Kolmogorov-Smirnov [KS] goodness-of-fit test, provided by the PRL analysis-software and presented in the Psilab Manual (1985), and more fully in Knuth (1981, pp.45-58). The choice of the KS was prompted by the suggestion, in the Psilab Manual, that in assessing large amounts of randomness data the KS may be preferable to other, more commonly used statistics. It seemed that, insofar as the KS is sensitive to both local and global departures from theoretical expectation, it could be simultaneously used to examine the adequacy of the RNG, and the presence of any consistent scoring patterns, on the part of the subjects.

Essentially, the KS compares the distribution of the observed z-scores against their expected distribution. The degree of "fit" between the empirical and theoretical distributions is summarized by two statistics, K+ and K-, representing the average deviations of the empirical curve below and above (respectively) the theoretical distribution.

Results

Table 1 summarizes the results at the game-score level, based upon 118 z-scores for each of the four conditions. Depicted are the mean z-score, and the K+ and K- statistics of the KS goodness-of-fit tests. As can be seen from the p-values of Table 1 no significant departures from theoretical z-score distributions were obtained for feedback or silent data, in either experimental or control conditions.

Following Schechter (1987), each Volition game was classified as a "miss" or a "hit" according to the feedback z-score. Using appropriate t-tests, the mean silent z-scores for each type of game were compared to chance and to each other. Both mean silent z-scores were at chance ("miss" silent mean z=.163, t(61)=1.195, ns.; "hit" silent mean z=.042, t(54)=.343, ns). The difference between "hit" and "miss" silent data was not significant (t(115)=.655, ns).

The run-score results are graphically represented in Figure 1 (1a and 1b for experimental data, 1c and 1d for matched-simulation data); the frequency of each runscore is plotted against the theoretical baseline (the z=0 line). Table 2 summarizes results from the chi-square goodness-of-fit test, based upon 2360 runs (118 games x 20 runs) for each condition, and comparing the distribution of run-score values for all cells between 36-64 (inclusive) to the binomial theoretical distribution. (Given the number of observations involved, the expected frequency below 36 and above 64 was too low for a chi-square analysis; tail-end cells were collapsed, to maintain expected frequency above 5). As may be seen from Table 2, the goodness-of-fit analysis shows significantly high variance for the silent-experimental conditions (chi-square [28 df] = 47.03, p = .01). This translates to an effect size of .045 (by converting the probability value to a one-tailed z-score, then dividing the z-score by the square root of n). This is more than double the magnitude of the effect sizes of the Berger (1988) studies (calculated to be .008 and .02).

As shown in Figure 2, the result of 100 extended simulations for each condition ("feedback" and "silent") showed no excess of significant chi-square results. When the experimental and matched simulation data are juxtaposed against the extended simulations, we see that, while the matched-simulations showed good overall randomness, the experimental silent data lay in the tail-end of the distribution.

Discussion

The purpose of this exploratory study was to use a well-standardized computer-RNG task to examine subjects' psi performance in a setting quite different from that of the laboratory. The idea was to determine whether or not results would be consistent with those found in prior research, in view of large differences in subject incentives, subject-experimenter interactions, and general ambience during testing.

As suggested by the KS analyses, there were no significant departures from the expected distribution of terminal z-scores. Despite the (presumably) strong incentive value of a high end-game score, subjects were apparently unable to "push" the feedback line to a final result consistent with their goals (i.e., a large z-score). In this respect, the null end-game feedback results are similar to those reported in all previous Volition studies. On the other hand, insofar as there was no evidence for a silent effect at the level of the cumulative z-score, the present study does not replicate the PRL findings (showing some evidence for bidirectional scoring in the silent data). Nor do the results provide any strong support for the idea that feedback "missers" were silent "hitters"; though the trend was clearly consistent with that reported by Schechter (1987), it did not in any way approach significance. (It should be noted, however, that the present study's instructional set, emphasizing "extremeness" of scoring, was quite different from that of the PRL study, emphasizing directional scoring.)

At this point, it seems safe to state that, in tasks such as Volition, the researcher should not focus exclusively upon the end-game score to assess psi performance; at the very least, run-score measures should be included. As Berger (1988) has argued, in tests allowing for multiple subject-interventions, the most immediate "unit of effort" is the "buttonpress", i.e., the run. Many subjects who may not be able to maintain consistent performance, may nevertheless show short-lived performance "peaks", detectable at the level of the run-score.

This, at least, is suggested by the results of the present study. As shown in Table 2, while the matched-simulation run-score data showed good fit to the theoretical distribution, the experimental silent data were significantly deviated from chance. Given that the extended simulations also showed the adequacy of the RNG's operation, it seems safe to state that the observed silent effect was probably due to psi, and not to some software or hardware artifact. The silent result thus replicates the findings of Berger (1988), who obtained similar run-score effects in the silent data of two Volition studies, as well as in two other studies (using Psi Invaders, another Psilab program). Indeed, the effect size of the silent result of the present study was considerably larger than those of the two Berger studies. Perhaps the psychic contest situation somehow created a psi-conducive dynamic (which, unfortunately, did not manifest in the explicit task!). Also, it is possible that the screening procedure - the Buddha game - heightened the expectations of those who made it through into Volition, and thus contributed to silent scoring.

In general, the present Volition results are conceptually consistent with those of a number of studies, showing more pronounced effects in silent or non-feedback RNG data than in feedback data (Berger, Schechter & Honorton, 1986; Braud, 1978; Palmer & Perlstrom, 1987; Varvoglis & McCarthy, 1986). Insofar as the present experiment took place in a social - psychological context quite removed from laboratory settings, the results lend further support to the idea that silent effects indeed reflect subjects' experience of the task, rather than deriving from the tacit "demand characteristics" in laboratory settings.

Nevertheless, much remains to be done to adequately demonstrate the independence of silent effects from psi-mediated experimenter effects. Despite the unusual testing circumstances of the present study, it clearly cannot be considered a "stand-alone" experiment: there were at least two major ways in which investigator-psi may have shaped the results.

First, I myself may have contributed to the results during the unfoldment of the experiment. Of course, I was observing the progression of each game, and hoping for good outcomes. Simultaneously, there were a (highly variable) number of other observers, who, undoubtedly, were harboring mixed feelings toward high scorers (i.e., potential competitors for the first prize). Perhaps, at an unconscious level, I suspected that the only way to get a decent result out of this experiment was through the silent condition - while all the competing observers were busy focusing on the subject's feedback line. The possibility of unintentional experimenter-psi is certainly consistent with the fact that I accidentally obtained the highest score in the experiment.

Second, if we accept the premises of Observational theories, then we have yet someone else to blame for the silent effects: Rick Berger. Following completion of this study, and prior to any analysis or observation of the silent results, I sent duplicates of my data to Berger, who had kindly offered to do the run-score goodness-of-fit analyses for me, using the programs with which he had analyzed his Volition and Psi Invaders studies. Thus, in effect, Berger was the first observer of the present study's silent data. If we take the idea of retroactive-PK seriously, then it is possible that the pattern obtained in the silent data is due to Berger's psi, and not to the contest participants. In such a case, obviously, the current study could not be considered an independent replication of Berger's data - just a further confirmation of his psi!

In any event, insofar as this is the fifth Volition study showing some kind of silent effect, it encourages further exploration of such automated psi tests. The next step, it would seem, would be to collect psi data using a truly "self- standing" system (complete with instructional set, motivational devices, and no experimenter) while assessing any "observational" experimenter effects through split-data analyses. Perhaps such an approach would help us determine whether apparently systematic "errors" in psi - displacements, silent effects, field effects, etc.- are indeed intrinsic to the motivational/informational characteristics of the psi task (Varvoglis & McCarthy 1986), or whether they simply reflect investigators' and subjects' tacit construction of the meaning of the experiment (Weiner,1987).

Table 1: Mean-Z scores and KS Summary statistics

	Experimental		Simulation	
	Feedback	Silent	Feedback	Silent
mean-Z	-.016	.092	.108	-.014
p	.648	.323	.233	.632
K+	.57	.22	.21	.70
p	.517	.906	.917	.378
K-	.37	.89	.89	.78
p	.762	.207	.205	.295

Table 2: Run-score distributions (2360 runs)

	Experimental		Simulation	
	Feedback	Silent	Feedback	Silent
chi-sq(28 df)	26.47	47.03	24.08	28.57
p	.55	.01	.43	.68

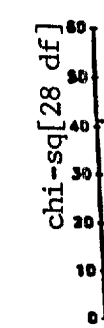


Fig.1: Feedback and Silent run-score distributions for Experimental and Matched-simulation data

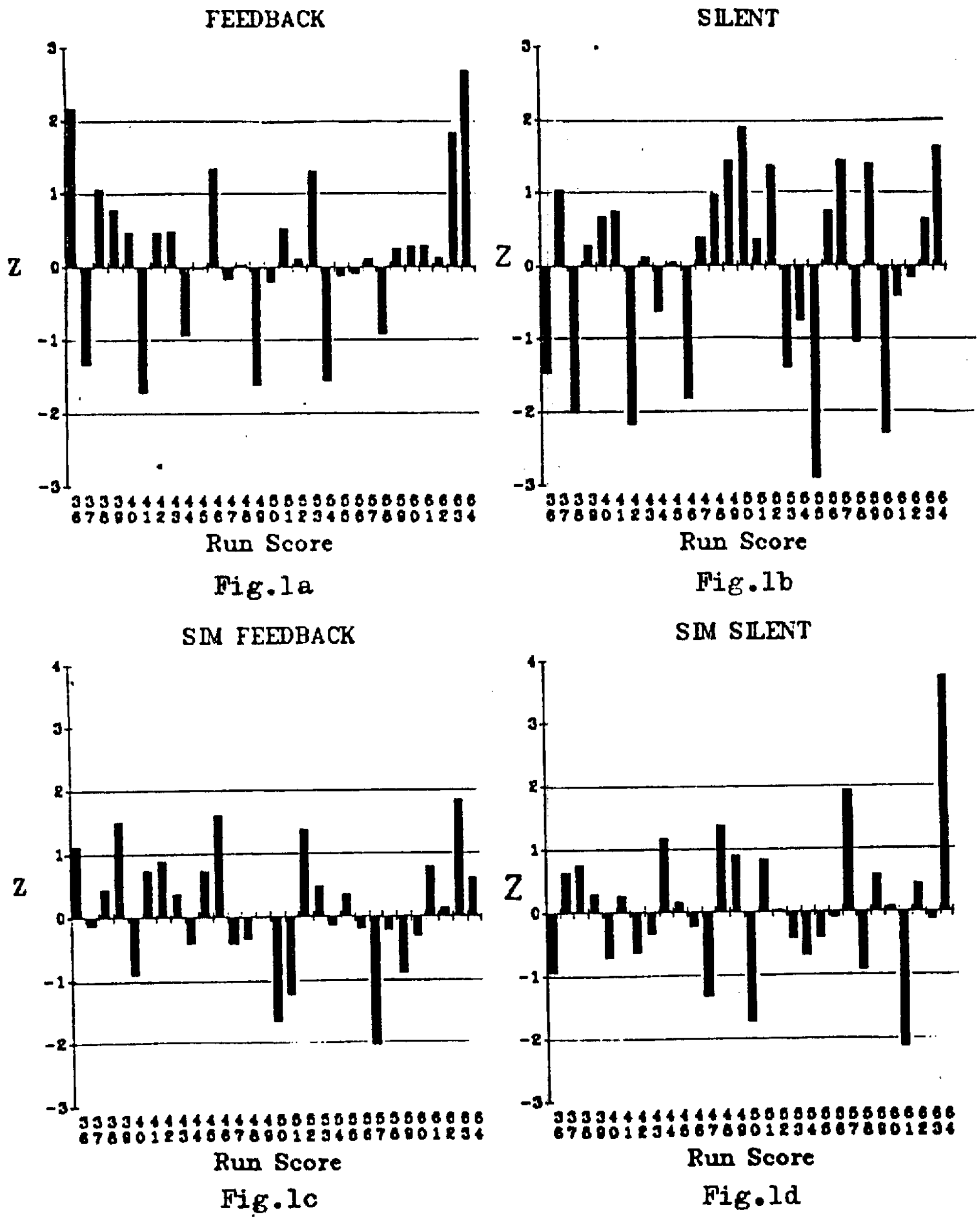
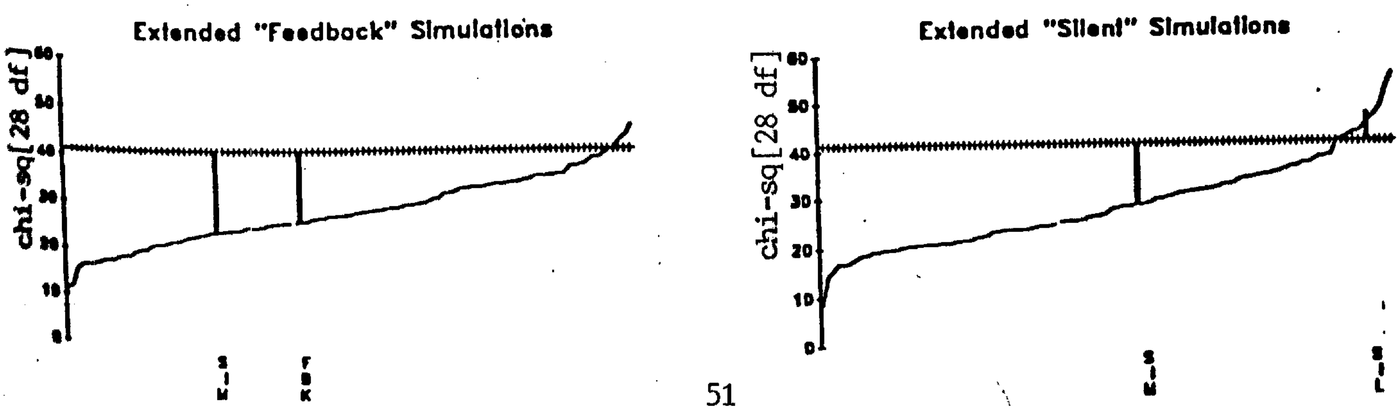


Fig 2: Extended "Feedback" & "Silent" Simulations and corresponding Experimental & Matched-simulation results



REFERENCES

Berger, R. E. (1988). Psi effects without real-time feedback. Journal of Parapsychology (in press).

Berger, R. E. and Honorton, C. (1984). PsiLab II: A standardized psi-testing system. Proceedings of the 27th Annual Meeting of the Parapsychological Association, 355-377.

Berger, R. E., Schechter, E. I. and Honorton, C. (1986). A Preliminary review of performance across three computer psi games. In D.Weiner and D.Radin (Eds.) Research In Parapsychology 1985 (pp. 1-3). Metuchen, NJ: Scarecrow Press.

Braud, W. G. (1978). Recent investigations of microdynamic psychokinesis, with special emphasis on the roles of feedback, effort, and awareness. European Journal of Parapsychology, 2, 137-162.

Knuth, D. E. (1981). The Art of Computer Programming: Vol. 2/Seminumerical Algorithms. Addison Wesley: Reading Mass.

Palmer, J. and Perlstrom, J. (1987). Random Event Generator PK in relation to task instructions. In D.H.Weiner and R.D.Nelson (eds.) Research In Parapsychology 1986 (pp.17-20). Metuchen, NJ: Scarecrow Press

Psychophysical Research Laboratories (1984). 1983 Annual Report. Princeton, N.J.: Psychophysical Research Laboratories.

Psychophysical Research Laboratories (1985). PsiLab II User's Manual. Princeton, N.J.: Psychophysical Research Laboratories.

Schechter, E. I. (1987). Missing and displacement in two RNG computer games. In D.H.Weiner and R.D.Nelson (eds.) Research In Parapsychology 1986 (pp.73-77). Metuchen, NJ: Scarecrow Press

Varvoglis, M. P. and McCarthy, D. J. (1986). Conscious-purposive focus and PK: RNG activity in relation to awareness, task-orientation and feedback. Journal of the American Society for Psychical Research, 80, 1-30.

Weiner, D. H. (1987). Thoughts on the role of meaning in psi research. In D.H.Weiner and R.D.Nelson (eds.) Research In Parapsychology 1986 (pp.203-223). Metuchen, NJ: Scarecrow Press